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EXAMINER	
MONDT, JOHANNES P	
ART UNIT	**PAPER NUMBER**
3663	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	12/27/2006	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/669,284	SAKAMA ET AL.	
	Examiner	Art Unit	
	Johannes P. Mondt	3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 June 2006 and 03 October 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *41-71* is/are pending in the application.

4a) Of the above claim(s) *51-56,60,61,65,66,70 and 71* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *41-50,57-59,62-64 and 67-69* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/13/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Amendments filed 2/21/06 and 6/19/06 together with Response to Restriction/Election Requirement mailed 8./30/06 form the basis for this action. In said Amendments applicant substantially amended the claims twice. Comments on Remarks submitted with said Amendment s are included under "Response to Arguments".

Election/Restrictions

Applicant's election of Group I, and, with traverse, of Species 1 and Species A in the reply filed on 10/03/06 is acknowledged. The traversal is on the ground(s) that none of the claims appear limited to said Species. This is not found persuasive because the Election-of-Species requirement was based on disclosure, not claims. See pages 2-3 of the Restriction/Election-of-Species Requirement.

The requirement is still deemed proper and is therefore made FINAL.

Information Disclosure Statement

The examiner has considered the items listed in the Information Disclosure Statement filed 11/13/06. A signed copy of Form PTO-1449 is herewith enclosed.

Request for Information

A request for Information under 37 CFR 1.105 is issued, requesting in particular experimental data showing that the lower limit and upper limit in the range as claimed

for oxygen, nitrogen and hydrogen concentrations have been reduced to practice. Said showing as requested should provide:

evidence of the reduction of practice as provided by the experimental data with the discussion of error analysis as conventionally required in the sciences showing that the lower limit and upper limit in the ranges as claimed for oxygen, nitrogen and hydrogen concentrations have been reduced to practice . This request of information is prompted by the apparent proximity of the resolution limit for concentrations of small amounts of hydrogen at around the time when the invention must have been reduced to practice, as witnessed for instance by Wörhoff et al (IEEE Catalog Nr. 0-7803-4947 (04/1998): "Silicon oxynitride in integrated optics", in LEOS'98, Volume 2, pp. 370-371 (1998)): see especially Table 2. Because the experimental data on one concentration impact on those of the other all three are herewith being requested. Prosecution history has shown that the concentrations as claimed occupy a prominent place in the invention, as witnessed for instance by the rejection mailed 1/12/05, 7/1/05, and 11/17/05 and the Remarks filed 4/14/05 and 10/05/05. It is therefore of the essence to ascertain the basis for reduction to practice of the claimed ranges. See MPEP, Patent Rules Appendix, 37 C. F.R. 1.105(a)(3)(i).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. ***Claims 41, 44, 45, 48, 51, 54, 57-61 and 67-69*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki et al (5,804,878) (previously cited) in view of Yamazaki et al (JP408055847A) (as made of record in IDS and previously cited), for which Yamazaki et al (5,970,384) (also made of record in IDS), - of which JP408055847A is Foreign Priority, serves as translation, and Wörhoff et al (IEEE Catalog Nr. 0-7803-4947 (04/1998): "Silicon oxynitride in integrated optics", in LEOS'98, Volume 2, pp. 370-371 (1998)).

On claim 41: Miyazaki et al teach a semiconductor device comprising a pixel portion and a driver circuit on a substrate (cf. col. 10, l. 52-col. 11, l. 3; Figures 1 and 6), comprising:

a base film 2 (corresponding to element with numeral 2 in Figure 1, and visible in Figure 6);

first, second and third semiconductor layers over said base film (said semiconductor layers corresponding to element with numeral 5 (obtained from semiconductor film 3) in Figure 1 (col. 7, l. 16-19) and corresponding to the semiconductor layers underneath each of three thin film transistors (pixel transistor TFT3 and driver transistors TFT1, TFT2, respectively, in Figure 6);

a first gate electrode (corresponding to 7 in Figure 1; col. 7, l. 20-21; cf. Figure 6) adjacent to said first semiconductor layer with a gate insulating film 6 (cf. col. 7, l. 16-18) interposed therebetween, wherein a first LDD region (corresponding to region 209 or 210 in Figure 2; col. 9, l. 30-38) in said first semiconductor layer (of TFT3) is not

overlapped with said first gate electrode (cf. Figure 6 and col. 10, l. 60-64: note that film 507 (207) is used as mask; col. 9, l. 30-38);

a second gate electrode (corresponding to 7 in Figure 1; col. 7, l. 20-21; cf. Figure 6) adjacent said second semiconductor layer with said gate insulation film 6 (cf. col. 11, l. 13-18) therebetween, a second LDD region in said semiconductor layer (of TFT2) is overlapped with said second gate electrode (cf. Figure 6 and col. 10, l. 60-64: note that the anode oxide film 506 is used as mask; col. 9, l. 30-38);

a third gate electrode (corresponding to 7 in Figure 1; col. 7, l. 20-21; cf. Figure 6) adjacent said third semiconductor layer with said gate insulation film 6 (cf. col. 11, l. 13-18) therebetween, a third LDD region in said semiconductor layer (of TFT3) is overlapped with said third gate electrode (cf. Figure 6 and col. 10, l. 60-64: note that the anode oxide film 505 is used as mask; col. 9, l. 30-38); and

wherein said pixel portion comprises said first semiconductor "film" (actually: layer: see under "Objections to Claims"), and said driver portion comprises said second and third semiconductor "films" (actually: layers: see under "Objections to Claims") (cf. col. 10, l. 52-61).

Miyazaki et al do not necessarily teach the limitation defined in the final five lines of claim 41: i.e.,

(a) "each of said gate insulating films and said base film comprises hydrogenated silicon oxynitride, and contains oxygen, nitrogen and hydrogen and contains oxygen, nitrogen and hydrogen, wherein the concentration of oxygen and nitrogen of said

hydrogenated silicon oxynitride film are from 55 to 70 at% and from 0.1 to 6 at%, respectively; and

(b) wherein the hydrogen concentration of said hydrogenated silicon oxynitride film is from 0.1 to 3 at%.

However, it would have been obvious to include said limitation (a) in view of *Yamazaki et al*, who, in a patent on an improved composition of gate insulation films in thin film transistors, - hence closely related art, teach the selection of hydrogenated silicon oxynitride of which the hydrogenation is reduced (cf. abstract): starting from a silicon dioxide film (concentration thus being 2/3 = 66.7 % oxygen, thus falling well within the claimed range of 55 to 70 percent) wherein through annealing by NH_3 nitrogen bonds are created so as to reduce the number of un-paired bonds (col. 4, l. 1-60) and in particular replacing the deleterious Si-H bonds and Si-OH bonds through replacement of the a substantial portion of the hydrogen with nitrogen (cf. col. 7, l. 1-32), with a stated nitrogen concentration of typically between 0.1 and 6 atomic % of N (col. 11, l. 49-54), thus substantially overlapping the claim limitation of 0.1 to 6 atomic % of N. Because the nitrogen only is able to replace pre-existing hydrogen and the hydrogen is further reduced through an annealing step (cf. abstract) it can be concluded logically that the H concentration is substantially less than 6 atomic %. Please note that Yamazaki et al teach the above film for both a gate insulating film (col. 3, l. 5-10) and for replacing a silicon oxide film “on an active layer”, which does apply to both gate and base films in Miyazaki et al.

Motivation to include the teaching by Yamazaki et al in the invention by Miyazaki et al at least derives from the resulting improvement of the gate insulation film's insulating properties through the substantial reduction of single hydrogen bonds.

Furthermore, it would have been obvious to include limitation ad (b) on hydrogen concentration in view of Wörhoff et al; who, in a publication on the "state of the art" of silicon oxynitride deposition" with application to integrated circuits (See Title and Abstract), hence analogous and pertinent to Yamazaki et al, teach that the H concentration in silicon oxynitride films manufactured by plasma enhanced or low pressure CVD, the methods employed by Yamazaki et al, do contain hydrogen in the claimed range, i.e., plasma-enhanced CVD or LCVD, the methods used by Yamazaki et al as cited for the hydrogen content (col. 5, l. 45-59), followed by an anneal step as also taught by Yamazaki et al (see col. 7, l. 1-32 as cited) in an effort to reduce said hydrogen content leads to a hydrogen content in a range that includes 0.4 at%, and 1.3 at% and 4.5%, thus quite substantially overlapping with the range as claimed (01.- 3 at%) (see Table 2 and discussion, especially section II (page 370, second column). It thus appears that the overall hydrogen content of the hydrogenated oxynitride film is characterized by a hydrogen concentration in the claimed range when made in a same manner as carried out by Yamazaki et al as documented by the measurements published by Wörhoff et al.

Applicant is reminded that a *prima facie* case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art or when the ranges of a claimed composition do not overlap but are close enough such

that one skilled in the art would have expected them to have the same properties. In re Peterson, 65 USPQ2d 1379 (CA FC 2003).

On claim 44: said substrate is a glass substrate (cf. col. 8, l. 27-35).

On claim 45: Miyazaki et al teach a semiconductor device comprising a pixel portion and a driver circuit on a substrate (corresponding with element 201 in Figure 1) (cf. col. 8, l. 28-36, 10, l. 52-col. 11, l. 3; Figures 1 and 6), comprising:

first, second and third semiconductor layers over said substrate (said semiconductor layers corresponding to element with numeral 5 in Figure 1 (col. 7, l. 16-19) and corresponding to the semiconductor layers underneath each of three thin film transistors (pixel transistor TFT3 and driver transistors TFT1, TFT2, respectively, in Figure 6);

a first gate electrode (corresponding to 7 in Figure 1; col. 7, l. 20-21; cf. Figure 6) adjacent to (claim 45) or over (claim 51) (N.B.: "adjacent" means "nearby", "over" means "across a barrier or intervening space" (see Merriam-Webster's Collegiate Dictionary, 10th Edition, pages 14 and 827, respectively), while it is inherent to any gate electrode in an insulated gate field effect transistor such as the disclosed TFT to be both nearby and across a barrier from said semiconductor layer, the latter being the channel region of the insulated gate field effect transistor), said first semiconductor layer with a gate insulating film 6 (cf. col. 7, l. 16-18) interposed therebetween, wherein a first LDD region (corresponding to region 209 or 210 in Figure 2; col. 9, l. 30-38) in said first semiconductor layer (of TFT3) is not overlapped with said first gate electrode (cf. Figure 6 and col. 10, l. 60-64: note that film 507 (207) is used as mask; col. 9, l. 30-38);

a second gate electrode (corresponding to 7 in Figure 1; col. 7, l. 20-21; cf. Figure 6) adjacent said second semiconductor layer with said gate insulation film 6 (cf. col. 11, l. 13-18) therebetween, a second LDD region in said semiconductor layer (of TFT2) is overlapped with said second gate electrode (cf. Figure 6 and col. 10, l. 60-64: note that the anode oxide film 506 is used as mask; col. 9, l. 30-38);

wherein said pixel portion comprises said first semiconductor "film" (actually: layer: see under "Objections to Claims"), and said driver portion comprises said second and third semiconductor "films" (actually: layers: see under "Objections to Claims") (cf. col. 10, l. 52-61).

Miyazaki et al do not necessarily teach the limitation defined in the final five lines of claim 41: i.e.,

(a) "each of said gate insulating films and said base film comprises hydrogenated silicon oxynitride, and contains oxygen, nitrogen and hydrogen and contains oxygen, nitrogen and hydrogen, wherein the concentration of oxygen and nitrogen of said hydrogenated silicon oxynitride film are from 55 to 70 at% and from 0.1 to 6 at%, respectively; and

(b) wherein the hydrogen concentration of said hydrogenated silicon oxynitride film is from 0.1 to 3 at%.

However, it would have been obvious to include said limitation (a) in view of *Yamazaki et al*, who, in a patent on an improved composition of gate insulation films in thin film transistors, - hence closely related art, teach the selection of hydrogenated silicon oxynitride of which the hydrogenation is reduced (cf. abstract): starting from a

silicon dioxide film (concentration thus being 2/3 = 66.7 % oxygen, thus falling well within the claimed range of 55 to 70 percent) wherein through annealing by NH_3 nitrogen bonds are created so as to reduce the number of un-paired bonds (col. 4, l. 1-60) and in particular replacing the deleterious Si-H bonds and Si-OH bonds through replacement of the a substantial portion of the hydrogen with nitrogen (cf. col. 7, l. 1-32), with a stated nitrogen concentration of typically between 0.1 and 6 atomic % of N (col. 11, l. 49-54), thus substantially overlapping the claim limitation of 0.1 to 6 atomic % of N. Because the nitrogen only is able to replace pre-existing hydrogen and the hydrogen is further reduced through an annealing step (cf. abstract) it can be concluded logically that the H concentration is substantially less than 6 atomic %. Please note that Yamazaki et al teach the above film for both a gate insulating film (col. 3, l. 5-10) and for replacing a silicon oxide film "on an active layer", which does apply to both gate and base films in Miyazaki et al.

Motivation to include the teaching by Yamazaki et al in the invention by Miyazaki et al at least derives from the resulting improvement of the gate insulation film's insulating properties through the substantial reduction of single hydrogen bonds.

Furthermore, it would have been obvious to include limitation ad (b) on hydrogen concentration in view of Wörhoff et al, who, in a publication on the "state of the art" of silicon oxynitride deposition" with application to integrated circuits (See Title and Abstract), hence analogous and pertinent to Yamazaki et al, teach that the H concentration in silicon oxynitride films manufactured by plasma enhanced or low pressure CVD, the methods employed by Yamazaki et al, do contain hydrogen in the

claimed range, i.e., plasma-enhanced CVD or LCVD, the methods used by Yamazaki et al as cited for the hydrogen content (col. 5, l. 45-59), followed by an anneal step as also taught by Yamazaki et al (see col. 7, l. 1-32 as cited) in an effort to reduce said hydrogen content leads to a hydrogen content in a range that includes 0.4 at%, and 1.3 at% and 4.5%, thus quite substantially overlapping with the range as claimed (01.- 3 at%). It thus appears that the overall hydrogen content of the hydrogenated oxynitride film is characterized by a hydrogen concentration in the claimed range when made in a same manner as carried out by Yamazaki et al as documented by the measurements published by Wörhoff et al.

Applicant is reminded that a *prima facie* case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art or when the ranges of a claimed composition do not overlap but are close enough such that one skilled in the art would have expected them to have the same properties. In re Peterson, 65 USPQ2d 1379 (CA FC 2003).

On claim 48: Miyazaki et al teach a semiconductor device comprising a pixel portion and a driver circuit on a substrate (corresponding with element 201 in Figure 1) (cf. col. 8, l. 28-36, 10, l. 52-col. 11, l. 3; Figures 1 and 6), comprising:

first, second and third semiconductor layers over said substrate (said semiconductor layers corresponding to element with numeral 5 in Figure 1 (col. 7, l. 16-19) and corresponding to the semiconductor layers underneath each of three thin film transistors (pixel transistor TFT3 and driver transistors TFT1, TFT2, respectively, in Figure 6);

a first gate electrode (corresponding to 7 in Figure 1; col. 7, l. 20-21; cf. Figure 6) adjacent to (claim 48) or over (claim 54) said first semiconductor layer with a gate insulating film 6 (cf. col. 7, l. 16-18) interposed therebetween (N.B.: "adjacent" means "nearby", "over" means "across a barrier or intervening space" (Merriam-Webster's Collegiate Dictionary, 10^{th} Edition, pages 14 and 827, respectively), while it is inherent to any gate electrode in an insulated gate field effect transistor such as the disclosed TFT to be both nearby and across a barrier from said semiconductor layer, the latter being the channel region of the insulated gate field effect transistor), wherein a first LDD region (corresponding to region 209 or 210 in Figure 2; col. 9, l. 30-38) in said first semiconductor layer (of TFT3) is not overlapped with said first gate electrode (cf. Figure 6 and col. 10, l. 60-64: note that film 507 (207) is used as mask; col. 9, l. 30-38);

a second gate electrode (corresponding to 7 in Figure 1; col. 7, l. 20-21; cf. Figure 6) adjacent said second semiconductor layer with said gate insulation film 6 (cf. col. 11, l. 13-18) therebetween, a second LDD region in said semiconductor layer (of TFT2) is overlapped with said second gate electrode (cf. Figure 6 and col. 10, l. 60-64: note that the anode oxide film 506 is used as mask; col. 9, l. 30-38);

wherein said pixel portion comprises said first semiconductor "film" (actually: layer: see under "Objections to Claims"), and said driver portion comprises said second and third semiconductor "films" (actually: layers: see under "Objections to Claims") (cf. col. 10, l. 52-61).

Miyazaki et al do not necessarily teach the limitation defined in the final five lines of claim 41: i.e.,

(a) "each of said gate insulating films and said base film comprises hydrogenated silicon oxynitride, and contains oxygen, nitrogen and hydrogen and contains oxygen, nitrogen and hydrogen, wherein the concentration of oxygen and nitrogen of said hydrogenated silicon oxynitride film are from 55 to 70 at% and from 0.1 to 6 at%, respectively; and

(b) wherein the hydrogen concentration of said hydrogenated silicon oxynitride film is from 0.1 to 3 at%.

However, it would have been obvious to include said limitation (a) in view of *Yamazaki et al*, who, in a patent on an improved composition of gate insulation films in thin film transistors, - hence closely related art, teach the selection of hydrogenated silicon oxynitride of which the hydrogenation is reduced (cf. abstract): starting from a silicon dioxide film (concentration thus being 2/3 = 66.7 % oxygen, thus falling well within the claimed range of 55 to 70 percent) wherein through annealing by NH_3 nitrogen bonds are created so as to reduce the number of un-paired bonds (col. 4, l. 1-60) and in particular replacing the deleterious Si-H bonds and Si-OH bonds through replacement of the a substantial portion of the hydrogen with nitrogen (cf. col. 7, l. 1-32), with a stated nitrogen concentration of typically between 0.1 and 6 atomic % of N (col. 11, l. 49-54), thus substantially overlapping the claim limitation of 0.1 to 6 atomic % of N. Because the nitrogen only is able to replace pre-existing hydrogen and the hydrogen is further reduced through an annealing step (cf. abstract) it can be concluded logically that the H concentration is substantially less than 6 atomic %. Please note that Yamazaki et al teach the above film for both a gate insulating film (col. 3, l. 5-10) and for

replacing a silicon oxide film "on an active layer", which does apply to both gate and base films in Miyazaki et al.

Motivation to include the teaching by Yamazaki et al in the invention by Miyazaki et al at least derives from the resulting improvement of the gate insulation film's insulating properties through the substantial reduction of single hydrogen bonds.

Furthermore, it would have been obvious to include limitation ad (b) on hydrogen concentration in view of Wörhoff et al, who, in a publication on the "state of the art" of silicon oxynitride deposition" with application to integrated circuits (See Title and Abstract), hence analogous and pertinent to Yamazaki et al, teach that the H concentration in silicon oxynitride films manufactured by plasma enhanced or low pressure CVD, the methods employed by Yamazaki et al, do contain hydrogen in the claimed range, i.e., plasma-enhanced CVD or LCVD, the methods used by Yamazaki et al as cited for the hydrogen content (col. 5, l. 45-59), followed by an anneal step as also taught by Yamazaki et al (see col. 7, l. 1-32 as cited) in an effort to reduce said hydrogen content leads to a hydrogen content in a range that includes 0.4 at%, and 1.3 at% and 4.5%, thus quite substantially overlapping with the range as claimed (01.- 3 at%). It thus appears that the overall hydrogen content of the hydrogenated oxynitride film is characterized by a hydrogen concentration in the claimed range when made in a same manner as carried out by Yamazaki et al as documented by the measurements published by Wörhoff et al.

Applicant is reminded that a *prima facie* case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art

or when the ranges of a claimed composition do not overlap but are close enough such that one skilled in the art would have expected them to have the same properties. In re Peterson, 65 USPQ2d 1379 (CA FC 2003).

On claims 57, 58 and 59: said second semiconductor layer comprises a second source region and a second drain region (doped regions 208 and 211, see Figures 1, 6 and 7) (col. 7, 30-38, and elements 8; cf. col. 11, l. 13-18), and a second channel region between said second source and second drain regions (see claim 23 in Miyazaki et al; furthermore, a channel between source and drain is utterly inherent to any field effect transistor), said second LDD region is between said second channel and drain regions (element 209 is in between the channel, as the remaining portion after source/drain implementation of semiconductor region 203, and source/drain regions 208/211; cf. Figure 1), and said second source region is in (electrical) contact with said channel region (alternatively, said second source region can well be defined as comprising the LDD region on its side, in which alternative rejection the contact is not merely electrical but also material).

On claims 67- 69: the interlayer insulating film also is an insulating film on an active layer, namely on the gate electrode, and hence the teaching by Yamazaki et al also applies to said interlayer insulating film (col. 4, l. 48-59).

2a. ***Claims 42, 46 and 49*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki et al, Yamazaki et al and Wörhoff et al as applied to claims 41 and 45, respectively, above, and further in view of Patent Document owned by Sharp KK (Publication No.: JP 11101974 A) (previously cited). As detailed above, claims 41,

45, 48, 51, 54 are unpatentable over Miyazaki et al in view of Yamazaki et al. *Neither necessarily teach* the further limitation as defined by claims 42, 46, 49, 52, 55, respectively. *However, it would have been obvious* to include said further limitation in view of the Patent Document by Sharp KK, who teaches the application of liquid crystal display devices based on TFT transistors to (see Use): personal computers, portable information terminals, video apparatus, inter alia. Said application are thus seen to be obvious applications of the invention obtained by combining Miyazaki et al and Yamazaki et al.

3. ***Claims 43, 47 and 50*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki et al , Yamazaki et al and Wörhoff et al as applied to claims 41, 45, 48, 51, 55, respectively, above, and further in view of Tang et al (5,684,365)(previously cited). *As detailed above, claims 41, 45 and 48 are unpatentable* over Miyazaki et al in view of Yamazaki et al. *Neither necessarily teach the further limitation* defined by claims 43, 47, 50, 53 and 56, respectively. *However, it would have been obvious* to include said further limitation in view of Tang et al, who, in a patent on a electroluminescence (EL) display teach the inclusion of TFT electroluminescent pixels for the specific purpose to eliminate the need to pattern the EL cathode, from which it follows that the invention by Miyazaki et al finds obvious applications to EL display devices. *Motivation* thus stems from the immediate and obvious applicability of the invention by Miyazaki et al to the field of EL display technology.

4. ***Claim 62-64*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki et al, Yamazaki et al and Wörhoff et al as applied to claim 41 above, and further in view of Yamazaki et al (5,784,073) (previously cited), henceforth referred to as Yamazaki2. *As detailed above, claims 41, 45 and 48 are unpatentable over Miyazaki et al in view of Yamazaki et al.*

Furthermore, Miyazaki et al teach that said semiconductor device further comprises:

a first insulating film 207 (cf. Figure 7 and col. 9, l. 16-30) over said first, second, and third gate electrodes;

a second insulating film 217 (cf. Figure 7 and col. 10, l. 30-35) over said first insulating film;

and

a pixel electrode 13, 508 (cf. Figures 1 and 7) (cf. col. 8, l. 7-25 and col. 10, l. 63 – col. 11, l. 1) over said second insulating film connected to said first semiconductor layer (i./e, the layer of the pixel TFT: this is what makes said TFT3 a pixel TFT, being inherent in the pixel TFT3).

Neither Miyazaki et al nor Yamazaki et al necessarily teach the further limitation as defined by claims 62-66, namely: of a third insulation film comprising organic resin over said second insulating film, with said pixel electrode also being over said third insulating film.

However, it would have been obvious to include said further limitation in view of *Yamazaki2*, who, in a patent on an electro-optical device based on thin film transistors

(col. 3, l. 33 – col. 4, l. 25), - hence closely related to the invention by Miyazaki et al, teach the inclusion of an organic resin layer 119 for the specific purpose of flattening prior to forming the pixel electrode thereon (cf. col. 16, l. 16-35).

Motivation, to include the teaching by Yamazaki2 in the invention by Miyazaki et al, lies in the resulting substantially flat surface over which the pixel electrode can be laid, thus reducing the abrasiveness, and with it the mechanical vulnerability, of the structure. Furthermore, the mechanical contact between the pixel electrode and the insulating material is enhanced through the planarization, thus increasing mechanical integrity.

Response to Arguments

Applicant's arguments filed in Remarks together with said Amendments have been fully considered but they are not persuasive. Counter to Applicant's argument in traverse of the original rejection over Miyazaki et al in view of Yamazaki et al that the cited concentrations were disclosed to be throughout, and, subsequently, that "throughout the thickness" is understood by those of skills in the art even without recitation in the specification, are not persuasive of error in the rejection for the claim language in which "throughout the thickness" was not recited, made in the action mailed 1/12/05. The patentable weight of "throughout the thickness" cannot be introduced into the claim language because this limitation is not disclosed, while without it the claim language is unpatentable over Miyazaki et al in view of Yamazaki et al. In this regard

please note that Yamazaki et al as relied upon (see original reference to col. 7, l. 1-32, especially see l. 13-16) does meet the claim limitation on nitrogen concentration.

With regard to H concentration, as also mentioned in the original rejection mailed 1/12/05 a H concentration in the range from 0.1 % to 3 (atomic) % is at least obvious over art that has come to light in an update search in the form of Wörhoff et al, as explained in the grounds for rejection included above: in short, plasma-enhanced CVD or LCVD, the methods used by Yamazaki et al as cited for the hydrogen content (col. 5, l. 45-59), followed by an anneal step as also taught by Yamazaki et al (see col. 7, l. 1-32 as cited) in an effort to reduce said hydrogen content leads to a hydrogen content in a range that includes 0.4 at%, and 1.3 at% and 4.5%, thus quite substantially overlapping with the range as claimed (01.- 3 at%). It thus appears that the overall hydrogen content of the hydrogenated oxynitride film is characterized by a hydrogen concentration in the claimed range when made in a same manner as carried out by Yamazaki et al as documented by the measurements published by Wörhoff et al. For this reason a new rejection is provided, and, in view of the new reference to Wörhoff et al, the rejection is made to be non-final.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Teramoto, JP – 06 –318703 (IDS filed Nov. 13, 2006).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P. Mondt whose telephone number is 571-272-1919. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack W. Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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JPM
December 20, 2006

Patent Examiner:

Johannes Mondt (Art Unit: 3663)